Sub-Fossil Potoroos in South-Eastern Australia; with a Record of *Potorous longipes* from New South Wales

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The small marsupials of the family Potoroidae comprise a group which has been dramatically reduced in range and abundance as a result of post-European settlement changes to the environment (Seebeck and Rose 1988). The presence of remains, as sub-fossil, in cave deposits has therefore been used to aid the determination of the extent of the former distribution of a number of species. Several authors (Hope 1969; Johnston 1973; Seebeck 1981; Seebeck, Bennett and Scotts 1989) have incorporated such data in reporting upon *Potorous tridactylus,* which species is present in many deposits in Victoria (Wakefield 1969).

In 1980 Seebeck and Johnston described a new species, *Potorous longipes* from modern material collected in east Gippsland, Victoria. *P. longipes* has not been reported from any sub-fossil sites in eastern Victoria or south-eastern New South Wales (from whence Dovey (1987) has described its recent discovery as a living species). However, Hope (1969) recognised the novelty of a specimen of *Potorous* from Yarrangobilly Caves, New South Wales (Fig.1) in relation to other specimens of

Fig. 1. Localities mentioned in the text.

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Potorous she had examined. She segregated that specimen and two other enigmatic specimens (C 6761 and C 6973 in the collections of Museum of Victoria) which had been collected in Victoria in the 19th century, from *P. tridactylus* and *P. apicalis.* These names are now synonymized in *P. tridactylus* (Johnston 1973; Johnston and Sharman 1976). The odd specimens are presently under study; they are not *P. tridactylus* and may represent an undescribed taxon. Seebeck (1981) excluded them from his discussions of *P. tridactylus* in Victoria.

I have re-examined the Yarrangobilly specimen (N.A. Wakefield Y1 in Hope 1969; now F 81966, in the collections of The Australian Museum (AM), Sydney). It was probably collected by the late J.A. Mahony, then at the Department of Geology and Geophysics, University of Sydney. However, details of collection date and precise location in the caves complex cannot now be ascertained (J.H. Hope, Australian National University, *in litt.* 8 August 1980).

The specimen (shown in Fig.2) consists of a damaged skull and associated left dentary. The dorsal surface of the skull has been eroded; the nasals, frontals and parietals are missing. Almost the entire ventral area is complete; it lacks only the hamular processes, which have been broken off. The only teeth missing are the right I2 and I3 and the left I3. M5 is barely erupted. In life the tooth may not have broken through the gum tissue. Wear on all other teeth is minimal. I consider the animal to be young, just adult, on the basis of the eruption of the permanent premolar, the condition of M5 and the lack of significant tooth wear. In *P. tridactylus* that combination of characters is found in animals less than 18 months old (Seebeck, unpublished). *P. longipes* attains adult size at about 15 months (Seebeck 1992). The coronoid process of the dentary is broken

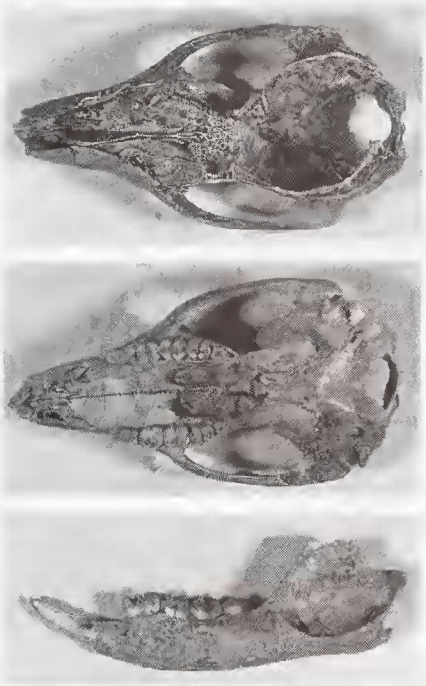

Fig. 2. *potorous longipes* from Yarrangobilly. Skull (dorsal and bentral views) and left dentary.

off about half-way along the ascending ramus, otherwise the dentary is complete. All teeth except M5 are present. The latter had erupted, or nearly so, judging from the appearance of the alveolus.

I identify specimen AM F 81966 as *P. longipes* for the following reasons, when compared with *P. tridactylus:* the jugal-squamosal junction is anterior in position relative to the premaxilla; the paroccipital process is enlarged; the tympanic bullae are narrow; the gap between I3 (alveolus) and C is small; M5 is small; a large foramen anterior to the optic foramen is present. It cannot readily be photographed but is not present in *P. tridactylus;* the palatal foramina are large. The dentary is robust with a more acutely-angled ascending ramus. Table 1 provides measurements of the specimen and measurements from the series of adult or near-adult *P. longipes* presently available, for comparison. Both skull and dentary are marginally shorter than the shortest skull measured (a sub-adult, NPWD 13346) but all other measurements fall within the range determined for *P. longipes* and exceed similar values for *P. tridactylus* from east Gippsland (Seebeck and Johnston 1980).

Table 1: Measurements (mm) and cranial and mandibular ratios of Yarrangobilly *P. longipes* compared with modern speciments (* n=6. All others n=7).

Abbreviations:

- **BAL** - basal length of skull;
- **ZW** - maximum width across the zygoma;
- **PR-S/J** - distance between most anterior point of premaxilla and most anterior part of the jugal/squamosal suture;
- **PAW** - maximum width of palate from external border of molar alveolae;
- **PAL** - maximum length of palate from posterior border to most anterior part of premaxilla;
- **PFL** - length of palatine foramina;
- **TBL** - length of tympanic bulla;
- **LP^3** - length of permanent premolar;
- **LM^{2-4}** - length of molar row at alveolae;
- **LD** - maximum length of dentary;
- **WR** - maximum width of ramus;
- **HDM_3** - height of dentary at M_3;
- **WDM_3** - width of dentary at M_3;
- **AR** - angle of ascending ramus.

	Yarrangobilly	Modern Mean ± SD	Modern Range
BAL	73.5	77.61 ± 2.16	74.2 - 80.3
ZW	41.2	44.40 ± 2.24*	41.0 - 46.7
PR-S/J	52.4	55.87 ± 1.49*	53.5 - 57.6
PAW	21.2	21.39 ± 0.70	20.5 - 22.5
PAL	46.2	47.77 ± 3.16*	43.6 - 51.5
PFL	12.5	12.76 ± 0.70*	11.7 - 13.6
TBL	8.5	8.39 ± 0.34	7.7 - 8.7
LP^3	7.0	6.55 ± 0.37*	6.0 - 7.0
LM^{2-4}	15.0	13.81 ± 0.73	13.0 - 15.3
LD	49.6	54.94 ± 2.57	50.6 - 58.5
WR	16.8	16.12 ± 1.03	14.5 - 17.2
HDM_3	9.0	8.93 ± 0.45	8.3 - 9.5
WDM_3	4.7	5.20 ± 0.57	4.6 - 6.2
AR	126°	126.70° ± 4.07°	122° - 132°
M^1LxW	3.1x3.1	3.33 ± 0.22*	3.1 - 3.7
		x3.32 ± 0.32*	x3.0 - 3.9
PR-S/J/BAL	0.713	0.719 ± 0.004*	0.713 - 0.726
ZW/BAL	0.561	0.570 ± 0.018*	0.55 - 0.60
PFL/PAL	0.271	0.267 ± 0.020*	0.23 - 0.28
LP^3/BAL	0.095	0.084 ± 0.004*	0.078 - 0.087
LM^{2-4}/PA	0.204	0.293 ± 0.015*	0.27 - 0.31
HDM_3/LD	0.181	0.166 ± 0.008*	0.16 - 0.18
WR/LD	0.339	0.293 ± 0.020*	0.26 - 0.32

Both skull and dentary were visually compared with the type specimen of *P. longipes* (and all other specimens of that species that are available) as well as representative examples of *P. tridactylus* from east Gippsland.

Other specimens of *Potorous* have been collected at Yarrangobilly Caves, some by J.A. Mahony (details unknown) and some by J.H. Hope in December 1970, from North Deep Creek Cave. The material, which is in the Australian Museum, consists of two damaged skulls, AM F 81969 and F 82134, and four dentaries, F 81967, F 81968, F 82135 and F 82136. One of the dentaries F 81967 or F 81968 may have been associated with skull F 81969 but this is uncertain.

All this material is identified as *P. tridactylus* by reference to known specimens and to the published description of *P. longipes* (Seebeck and Johnston 1980). Dentaries of *P. tridactylus* are much less robust than those of *P. longipes,* and the ascending ramus angle is much greater. All the specimens are juvenile or sub-adult *i.e.* deciduous premolar P2 and deciduous molar M1 present, permanent molar row incompletely erupted.

Several other cave deposits in south-eastern Australia have yielded *Potorous.* Hall (1977 and *pers. comm.* 1979) found *P. tridactylus* at Marble Arch and Bendethra Caves, both south of Braidwood, New South Wales. All the specimens were isolated incomplete dentaries, two (M2/6 and M2/7) from Marble Arch, and two (CM 34.1 and CM 34.2) from Bendethra. All are juveniles, all with P2 and M1 (or their alveoli) present. In three of the specimens M3 is unerupted, in the other it has only just erupted. I have examined these specimens and confirmed Hall's specific identification.

Dovey (pers. comm. April 1988) collected a single maxillary fragment from Clarke's Cave, near Marble Arch. I have examined this specimen, which consists of the molar tooth row and associated bone. It is *P.tridactylus,* an adult with virtually unworn teeth.

Gorter (1977) reported a single specimen of *P.tridactylus* from Douglas Cave south-east of Dubbo. No details were given and I have not examined the specimen. The age of the deposit was estimated at about 29,000 years BP. The site is remote from any presently-known *Potorous* locality.

Broom (1896) described *P. tridactylus antiquus* from the Wombeyan Caves breccia; Ride (1969) retrieved further specimens of *Potorous* from the breccia, but did not revise the status of the form, believing that the fauna of the breccia was composed largely of extinct precursor forms of modern species. Wakefield (1969, 1972) re-examined Broom's and Ride's material and concluded that many of the novelties described by Broom were, in fact, conspecific with modern species, although slightly smaller in size. The nominated lectotype of *P. t.antiquus* (AM F 4201) is juvenile, with P3 unerupted. The paratype AM F 51880 is incomplete, with P3 not fully erupted. I have examined these two specimens and confirm that they are *P. tridactylus.*

Wakefield (1960, 1967) reported *P. tridactylus* from the Pyramids Cave in the Buchan area, Victoria. Adult and juvenile remains were included in the collection, but all are referable to *P. tridactylus.* Later, Wakefield (1969, 1972) recognized two forms of *Potorous* in eastern Australia, but confused their identities in attempting to assign them to then-existing named taxa. He separated *P. tridactylus* from *P. apicalis* on the basis of cranial proportions (broad palate and rostrum v.narrow palate and rostrum), curvature of the tooth row (curved v. straight) and shape of P3 (curved v. straight). He applied the name *P. tridactylus* to animals from south-western Western Australia, "eastern N.S.W.", the "mountains of eastern Victoria", the Wombeyan fossil material of Broom and Ride, and to the modern specimen registered FWD MT1878 (FWD = Fisheries and Wildlife Division, Victoria). This last specimen is in fact a paratype of *P. longipes* (Seebeck and Johnston 1980). The name *P. apicalis* was applied to animals from Tasmania, Bass Strait islands

and southern Victoria, and to all the cave deposit specimens examined by Wakefield (1969). But *P. apicalis* = *P. tridactylus* (Johnston and Sharman 1976), and all material, both that from cave deposits and modern specimens reported by Wakefield is *P. tridactylus*, with the sole exception of MT1878 referred to above.

Wakefield (1963a, b, 1964a, 1967) reported the occurrence of *P. tridactylus* in a number of cave deposits in western Victoria. All the specimens that I have been able to examine from these collections are *P. tridactylus*. Wakefield (1964b) also identified *P. platyops* (as *P. morgani*, a junior synonym) from archaeological deposits on the lower Glenelg River, South Australia. That species is not recorded from Victoria.

Although few sub-fossil and fossil specimens of *Potorous* are thus far known from south-eastern New South Wales and eastern Victoria, the fact that only one has been referable to *P. longipes* supports modern observations that the species is, and probably always has been rare. It should be noted that Yarrangobilly is some 190 km north of the northern-most locality in Victoria, about 180 km north-north-west of the New South Wales site reported by Dovey (1987) and is now bioclimatically quite different from known and predicted *P. longipes* habitat (Scotts and Seebeck 1989; Norton and Saxon 1991); no palaeoecological conclusions can be drawn from this occurrence.

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